

WHAT IS CLAIMED IS:

1. A probe for detecting light or irradiating light, comprising:
 - a cantilever supported at an end thereof by a substrate;
 - a hollow tip formed at a free end of the cantilever;
 - a microaperture formed at the end of the tip; and
 - 10 a hollow waveguide formed inside the cantilever.
2. The probe according to claim 1, wherein said waveguide has a V-shaped transversal cross section.
- 15 3. The probe according to claim 1, wherein said waveguide has a trapezoidal transversal cross section.
- 20 4. The probe according to claim 1, wherein said waveguide has a U-shaped transversal cross section.
- 25 5. The probe according to claim 1, wherein said tip is shaped as a square cone.
6. The probe according to claim 1, wherein the

direction of the end of said tip is substantially perpendicular to the longitudinal direction of said cantilever.

5 7. The probe according to claim 1, wherein said cantilever is principally composed of silicon.

10 8. The probe according to claim 1, wherein said probe is provided therein with a mirror for guiding light transmitted in a hollow interior of said hollow waveguide to said microaperture or guiding light entering from said microaperture to said hollow waveguide.

15 9. The probe according to claim 1, wherein said mirror is a concave mirror.

20 10. A method for producing a probe for light detection or light irradiation, which comprises the steps of:

 working a substrate to form a groove therein, forming a flat plate-shaped cover portion on the groove to form a hollow waveguide having an opening in a part thereof,

25 forming a hollow tip having a microaperture on the opening, and

 removing a part of the substrate by etching, to

form a cantilever.

11. The method according to claim 10, wherein
said groove is formed by etching said substrate.

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12. The method according to claim 11, wherein
said groove is formed by crystal-anisotropic etching of
said substrate.

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13. The method according to claim 10, further
comprising a surface treatment step of forming said
groove or said cover portion into a mirror surface
state.

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14. The method according to claim 10, wherein
said cover portions is formed from an SOI (silicon on
insulator) layer of an SOI substrate.

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15. The method according to claim 10, wherein
said cover portion is formed by filling said groove
with a resin layer and forming a metal film on said
resin layer.

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16. The method according to claim 10, wherein
said step of forming said hollow tip having said
microaperture on said opening comprises the steps of:
forming a film of a tip material on a recess

formed on a substrate,

transferring the tip material onto the opening,

and

etching the end of a follow tip resulting from

5 the transferring step to form the microaperture.

17. The surface observation apparatus provided
with at least one probe selected from the group
consisting of probes according to any one of claims 1
10 to 9 and probes produced by a method according to any
one of claims 10 to 16.

18. An exposure apparatus provided with at
least one probe selected from the group consisting of
15 probes according to any one of claims 1 to 9 and probes
produced by a method according to any one of claims 10
to 16.

19. An information processing apparatus
20 provided with at least one probe selected from the
group consisting of probes according to any one of
claims 1 to 9 and probes produced by a method according
to any one of claims 10 to 16.